

Amendments to the Specification:

Please replace the paragraph beginning on page 7, line 5, which starts with "In this context," with the following amended paragraph:

In this context, fig's 1 and 2 show schematic side views of a work piece 10 and 20 respectively. In fig. 1, a silicon substrate 11, 6" x 6" x 1 mm, is coated with a silicon dioxide (deposited or grown) layer 12 that is 1 - 2 microns thick. The silicon dioxide layer 12 has a photosensitive sol-gel film 13 formed on it by well-understood techniques such as spinning and/or dip coating.

Please replace the paragraph beginning on page 7, line 15, which starts with "The notation - R -", with the following amended paragraph:

The notation - R - refers to anyone of a group of volatile organic materials including CH₃; CH₃ - CH₂, CH₃ - CH₂ - CH₂ [[-]] and the like. The notation - M - refers to any one of the metals of group IVB of the periodic table including Ge, Sn and Pb; group VIB including Se and Te; group VIIIA including Fe, Co, Ni; and group IVA including Ti and Zr and rare earth metals such as Er, Eu, Pr and Tm. The concentration of the metal determines the index of refraction of the sol-gel film in conjunction with the energy of the light used in the subsequent exposure steps.

Please replace the paragraph beginning on page 8, line 3, which starts with “The photosensitive sol-gel”, with the following amended paragraph:

The photosensitive sol-gel film (13 or 23) is exposed to white or ultra violet radiation through a mask to define, illustratively, three regions. The regions are identified in fig. 1 as exposed region 31 with unexposed regions 32 and 33 defining interfaces 34 and 35 with region 31 respectively. Fig. 1 also can be seen to include a silicon substrate 11 and a silicon dioxide surface layer 12.

Please replace the paragraph spanning pages 12 and 13 of the specification with the following amended paragraph:

The photosensitive sol-gel process permits the precise control of refractive index to produce a variable refractive index distribution along the horizontal plane of the film. To obtain variable refractive index gradient waveguide channels, the photosensitive sol-gel film (13 of fig. 1) is exposed using a photo mask. Exposure to ~~[[UV-]]~~ UV or visible light through the mask induces a photochemical reaction of the photosensitizer immobilized in the sol-gel matrix. A percentage of photosensitizer transforms to a metal oxide depending on the degree of light exposure (controlled by the photo mask). The metal oxide acts as a refractive index modifier of the silica film. Thus, the use of a gray scale photo mask allows the concentration of metal oxide, or refractive index profile, along the light propagation path of the waveguide (channel) to be controlled.